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Application No. 10/517,277
Amdt. Dated: April 9-2010
Reply to Office Action of Dec-23-2009

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Amendments to the Claims:

1. and 2. (Cancelled)

3. (Currently amended) A process of preparing a canola protein isolate, which comprises:

- (a) crushing canola oil seeds to form canola oil and canola oil seed meal therefrom,
- (b) separating the canola oil from the canola oil seed meal.
- (c) solvent (c) solvent extracting the canola oil seed meal to recover residual canola oil therefrom to produce a solvent-extracted canola oil seed meal.
- (d) removing (d) removing solvent from the extracted canola oil seed meal at a temperature of 15° to 50°C under vacuum to provide a desolvanted canola oil seed meal,
- (e) extracting (e) extracting the desolvanted canola oil seed meal to cause solubilization of protein in said desolvanted canola oil seed meal and to form an aqueous canola protein solution having a pH of about 5 to about 6.8,
- (f) separating (f) separating the aqueous canola protein solution from residual canola oil seed meal,
- (g) increasing (g) increasing the protein concentration of said aqueous canola protein solution while maintaining the ionic strength substantially constant by using a selective membrane technique to provide a concentrated canola protein solution,
- (h) diluting (h) diluting said concentrated canola protein solution into chilled water having a temperature of below 15°C to cause the formation of discrete canola protein particles in the aqueous phase in the form of micelles,
- (i) settling (i) settling the canola protein micelles to form an amorphous, sticky, gelatinous, gluten-like canola protein micellar mass, and
- (j) recovering (j) recovering the canola protein micellar mass from supernatant, the canola protein micellar mass having a canola protein content of at least 90 wt% (N x 6.25) on a dry weight basis, wherein said steps (d) to (i) (e) to (i) are effected in a semi-continuous mode of operation.

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4. (Currently amended) A process of preparing a canola protein isolate, which comprises:

- (a) crushing canola oil seeds to form canola oil and canola oil seed meal therefrom,
- (b) separating the canola oil from the canola oil seed meal,
- (c) solvent extracting the canola oil seed meal to recover residual canola oil therefrom to produce a solvent-extracted canola oil seed meal,
- (d) removing (e) removing solvent from the extracted canola oil seed meal at a temperature of 15° to 50°C under vacuum to provide a desolvanted canola oil seed meal,
- (d) extracting (e) extracting the desolvanted canola oil seed meal to cause solubilization of protein in said desolvanted canola oil seed meal and to form an aqueous canola protein solution having a pH of about 5 to about 6.8,
- (e) separating (f) separating the aqueous canola protein solution from residual canola oil seed meal,
- (f) increasing (g) increasing the protein concentration of said aqueous canola protein solution while maintaining the ionic strength substantially constant by using a selective membrane technique to provide a concentrated canola protein solution,
- (g) diluting (h) diluting said concentrated canola protein solution into chilled water having a temperature of below 15°C to cause the formation of discrete canola protein particles in the aqueous phase in the form of micelles,
- (h) settling (i) settling the canola protein micelles to form an amorphous, sticky, gelatinous; gluten-like canola protein micellar mass, and
- (i) recovering (j) recovering the canola protein micellar mass from supernatant, the canola protein micellar mass having a canola protein content of at least 90 wt% (N x 6.25) on a dry weight basis, wherein said steps (d) to (i) (e) to (j) are effected in a continuous mode of operation.

5. to 10. (Cancelled)

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11. (Currently amended) The process of claim 4 wherein said extraction step is effected by:

- (i) continuously mixing said desolvantedized canola oil seed meal with an aqueous salt solution having an ionic strength of at least 0.10 and a pH of about 5 to about 6.8 at a temperature of about 5° to about 65°C, and
- (ii) continuously conveying said mixture through a pipe while extracting canola protein from the desolvantedized canola oil seed meal to form an aqueous canola protein solution having a canola protein content of about 5 to about 40 g/L for a period of time up to 10 minutes.

12. (Original) The process of claim 11 wherein said salt solution has an ionic strength of about 0.15 to about 0.8.

13. (Original) The process of claim 11 wherein the salt solution has a pH of about 5.3 to about 6.2.

14. (Currently amended) The process of claim 11 wherein the concentration of [[oil]] said desolvantedized canola oil seed meal in said aqueous salt solution in said mixing step is about 5 to about 15% w/v.

15. (Previously presented) The process of claim 11 wherein said temperature is at least 35°C.

16. (Original) The process of claim 11 wherein said aqueous protein solution has a protein content of about 10 to about 30 g/L.

17. to 19. (Cancelled)

20. (Currently amended) A process of preparing a canola protein isolate, which comprises:

- (a) crushing canola oil seeds to form canola oil and canola oil seed meal therefrom,
- (b) separating the canola oil from the canola oil seed meal.

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(b) solvent (c) solvent extracting the canola oil seed meal to recover residual canola oil therefrom to produce a solvent-extracted canola oil seed meal,

(e) removing (d) removing solvent from the extracted canola oil seed meal at a temperature of 15° to 50°C under vacuum to provide a desolvanted canola oil seed meal,

(d) extracting (e) extracting the desolvanted canola oil seed meal to cause solubilization of protein in said desolvanted canola oil seed meal and to form an aqueous canola protein solution having a pH of about 5 to about 6.8,

(e) separating (f) separating the aqueous canola protein solution from residual canola oil seed meal,

(f) increasing (g) increasing the protein concentration of said aqueous canola protein solution while maintaining the ionic strength substantially constant by using a selective membrane technique to provide a concentrated canola protein solution,

(g) diluting (h) diluting said concentrated canola protein solution into chilled water having a temperature of below 15°C to cause the formation of discrete canola protein particles in the aqueous phase in the form of micelles,

(h) settling (i) settling the canola protein micelles to form an amorphous, sticky, gelatinous, gluten-like canola protein micellar mass, and

(i) recovering (j) recovering the canola protein micellar mass from supernatant, the canola protein micellar mass having a canola protein content of at least 90 wt% (N x 6.25) on a dry weight basis, wherein said desolvanted oil seed meal is desolvanted canola oil seed meal and, following said separating of the aqueous canola protein solution from the residual canola seed oil seed meal, the aqueous canola protein solution is subjected to a pigment removal step.

21. (Currently amended) The process of claim 20 wherein said pigment removal step is effected by diafiltration of the aqueous canola protein solution.

22. (Currently amended) The process of claim 20 wherein said pigment removal step is effected by mixing a pigment adsorbing agent with the aqueous canola

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protein solution and subsequently removing the pigment adsorbing agent from the aqueous canola protein solution.

23. (Original) The process of claim 22 wherein the pigment adsorbing agent is powdered activated carbon.

24. (Currently amended) A process of preparing a canola protein isolate, which comprises:

- (a) crushing canola oil seeds to form canola oil and canola oil seed meal therefrom,
- (b) separating the canola oil from the canola oil seed meal,
- (c) solvent extracting the canola oil seed meal to recover residual canola oil therefrom to produce a solvent-extracted canola oil seed meal,
- (d) removing (e) removing solvent from the extracted canola oil seed meal at a temperature of 15° to 50°C under vacuum to provide a desolvanted canola oil seed meal,
- (d) extracting (e) extracting the desolvanted canola oil seed meal to cause solubilization of protein in said desolvanted canola oil seed meal and to form an aqueous canola protein solution having a pH of about 5 to about 6.8,
- (e) separating (f) separating the aqueous canola protein solution from residual canola oil seed meal,
- (f) increasing (g) increasing the protein concentration of said aqueous canola protein solution while maintaining the ionic strength substantially constant by using a selective membrane technique to provide a concentrated canola protein solution,
- (g) diluting (h) diluting said concentrated canola protein solution into chilled water having a temperature of below 15°C to cause the formation of discrete canola protein particles in the aqueous phase in the form of micelles,
- (h) settling (i) settling the canola protein micelles to form an amorphous, sticky, gelatinous, gluten-like canola protein micellar mass, and
- (i) recovering (j) recovering the canola protein micellar mass from supernatant, the canola protein micellar mass having a canola protein content of at

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least 90 wt% (N x 6.25) on a dry weight basis, wherein said desolvanted canola oil seed meal is extracted with water and subsequent thereto salt is added to the resulting aqueous canola protein solution to provide an aqueous canola protein solution having an ionic strength of at least 0.10.

25. (Cancelled)

26. (Currently amended) A process of preparing a canola protein isolate, which comprises:

- (a) crushing canola oil seeds to form canola oil and canola oil seed meal therefrom,
- (b) separating the canola oil from the canola oil seed meal,
- (c) solvent extracting the canola oil seed meal to recover residual canola oil therefrom to produce a solvent-extracted canola oil seed meal,
- (d) removing (e) removing solvent from the extracted canola oil seed meal at a temperature of 15° to 50°C under vacuum to provide a desolvanted canola oil seed meal,
- (f) extracting (g) extracting the desolvanted canola oil seed meal to cause solubilization of protein in said desolvanted canola oil seed meal and to form an aqueous canola protein solution having a pH of about 5 to about 6.8,
- (h) separating (i) separating the aqueous canola protein solution from residual canola oil seed meal,
- (j) increasing (k) increasing the protein concentration of said aqueous canola protein solution while maintaining the ionic strength substantially constant by using a selective membrane technique to provide a concentrated canola protein solution,
- (l) diluting (m) diluting said concentrated canola protein solution into chilled water having a temperature of below 15°C to cause the formation of discrete canola protein particles in the aqueous phase in the form of micelles,
- (n) settling (o) settling the canola protein micelles to form an amorphous, sticky, gelatinous, gluten-like canola protein micellar mass, and

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(f) ~~recovering~~ (i) recovering the canola protein micellar mass from supernatant, the canola protein micellar mass having a protein content of at least 90 wt% (N x 6.25) on a dry weight basis, wherein said concentration step is effected by ultrafiltration to produce a concentrated the concentrated protein solution having a canola protein content of at least 250 g/L.

27. (Currently amended) A process of preparing a canola protein isolate, which comprises:

- (a) crushing canola oil seeds to form canola oil and canola oil seed meal therefrom,
- (b) separating the canola oil from the canola oil seed meal,
- (c) solvent (c) solvent extracting the canola oil seed meal to recover residual canola oil therefrom to produce a solvent-extracted canola oil seed meal,
- (d) removing (d) removing solvent from the extracted canola oil seed meal at a temperature of 15° to 50°C under vacuum to provide a desolvanted canola oil seed meal,
- (e) extracting (e) extracting the desolvanted canola oil seed meal to cause solubilization of protein in said desolvanted canola oil seed meal and to form an aqueous canola protein solution having a pH of about 5 to about 6.8,
- (f) separating (f) separating the aqueous canola protein solution from residual canola oil seed meal,
- (g) increasing (g) increasing the protein concentration of said aqueous canola protein solution while maintaining the ionic strength substantially constant by using a selective membrane technique to provide a concentrated canola protein solution,
- (h) diluting (h) diluting said concentrated canola protein solution into chilled water having a temperature of below 15°C to cause the formation of discrete canola protein particles in the aqueous phase in the form of micelles,
- (i) settling (i) settling the canola protein micelles to form an amorphous, sticky, gelatinous, gluten-like canola protein micellar mass, and

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(i) recovering (j) recovering the canola protein micellar mass from supernatant, the canola protein micellar mass having a canola protein content of at least 90 wt% (N x 6.25) on a dry weight basis, wherein said concentration step is effected by ultrafiltration to produce a concentrated protein solution having a protein content of at least 200 g/L and wherein said concentrated canola protein solution is warmed to a temperature of at least 20°C to decrease the viscosity of the concentrated canola protein solution but not beyond a temperature above which the temperature of the concentrated canola protein solution does not permit micelle formation.

28. (Currently amended) The process of claim 27 wherein said concentrated canola protein solution is warmed to a temperature of about 25°C to about 40°C.

29. to 31. (Cancelled)

32. (Currently amended) The process of claim 4 wherein said concentrated canola protein solution is continuously mixed with said chilled water to provide a dilution of the concentrated canola protein solution by about 15 fold or less.

33. (Previously presented) The process of claim 32 wherein said chilled water has a temperature of less than 10°C.

34. (Original) The process of claim 33 wherein said dilution is by about 10 fold or less.

35. (Cancelled)

36. (Currently amended) A process of preparing a canola protein isolate, which comprises:

- (a) crushing canola oil seeds to form canola oil and canola oil seed meal therefrom,
- (b) separating the canola oil from the canola oil seed meal,
- (c) solvent extracting the canola oil seed meal to recover residual canola oil therefrom to produce a solvent-extracted canola oil seed meal.

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(e) removing (d) removing solvent from the extracted canola oil seed meal at a temperature of 15° to 50°C under vacuum to provide a desolvanted canola oil seed meal,

(d) extracting (e) extracting the desolvanted canola oil seed meal to cause solubilization of protein in said desolvanted canola oil seed meal and to form an aqueous canola protein solution having a pH of about 5 to about 6.8,

(e) separating (f) separating the canola aqueous protein solution from residual canola oil seed meal,

(f) increasing (g) increasing the protein concentration of said aqueous canola protein solution while maintaining the ionic strength substantially constant by using a selective membrane technique to provide a concentrated canola protein solution,

(g) diluting (h) diluting said concentrated canola protein solution into chilled water having a temperature of below 15°C to cause the formation of discrete canola protein particles in the aqueous phase in the form of micelles,

(h) settling (i) settling the canola protein micelles to form an amorphous, sticky, gelatinous, gluten-like canola protein micellar mass, and

(i) recovering (j) recovering the canola protein micellar mass from supernatant, the canola protein micellar mass having a protein content of at least 90 wt% (N x 6.25) on a dry weight basis, wherein said recovered protein micellar mass has a protein content of at least 100 wt% (N x 6.25) on a dry weight basis.

37. (Currently amended) A process of preparing a canola protein isolate, which comprises:

(a) crushing canola oil seeds to form canola oil and canola oil seed meal therefrom,

(b) separating the canola oil from the canola oil seed meal,

(b) solvent (c) solvent extracting the canola oil seed meal to recover residual canola oil therefrom to produce a solvent-extracted canola oil seed meal,

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(c) removing (d) removing solvent from the extracted canola oil seed meal at a temperature of 15° to 50°C under vacuum to provide a desolvanted canola oil seed meal,

(d) extracting (e) extracting the desolvanted canola oil seed meal to cause solubilization of protein in said desolvanted canola oil seed meal and to form an aqueous canola protein solution having a pH of about 5 to about 6.8,

(e) separating (f) separating the aqueous canola protein solution from residual canola oil seed meal,

(f) increasing (g) increasing the protein concentration of said aqueous canola protein solution while maintaining the ionic strength substantially constant by using a selective membrane technique to provide a concentrated canola protein solution,

(g) diluting (h) diluting said concentrated canola protein solution into chilled water having a temperature of below 15°C to cause the formation of discrete canola protein particles in the aqueous phase in the form of micelles,

(h) settling (i) settling the canola protein micelles to form an amorphous, sticky, gelatinous, gluten-like canola protein micellar mass, and

(i) recovering (j) recovering the canola protein micellar mass from supernatant, the canola protein micellar mass having a canola protein content of at least 90 wt% (N x 6.25) on a dry weight basis, wherein ~~said oil seed meal is canola seed meal and, following recovering of the canola protein micellar mass therefrom, the supernatant is processed, on a batch, semi-continuous or continuous basis, to recover additional quantities of canola protein isolate therefrom.~~

38. (Currently amended) The process of claim 37 wherein said additional quantities canola of protein isolate are recovered from the supernatant by concentrating the supernatant to a canola protein concentration of about 100 to about 400 g/L, and drying the concentrated supernatant.

39. (Currently amended) The process of claim 37 wherein said additional quantities canola of protein isolate are recovered from the supernatant by concentrating the supernatant to a canola protein concentration of about 100 to about 400 g/L, mixing

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the concentrated supernatant with the recovered canola protein micellar mass, and drying the mixture.

40. (Currently amended) The process of claim 37 wherein said additional quantities of canola protein isolate are recovered from the supernatant by concentrating the supernatant to a canola protein concentration of about 100 to about 400 g/L, mixing a portion of said concentrated supernatant with at least a portion of the recovered canola protein micellar mass, and drying the resulting mixture.

41. (Currently amended) The process of claim 40 wherein the remainder of the concentrated supernatant is dried and any remainder of the recovered canola protein micellar mass is dried.

42. (Currently amended) A process of preparing a canola protein isolate, which comprises:

- (a) crushing canola oil seeds to form canola oil and canola oil seed meal therefrom,
- (b) separating the canola oil from the canola oil seed meal,
- (c) solvent extracting the canola oil seed meal to recover residual canola oil therefrom to produce a solvent-extracted canola oil seed meal,
- (d) removing solvent from the extracted canola oil seed meal at a temperature of 15° to 50°C under vacuum to provide a desolvanted canola oil seed meal,
- (e) extracting (f) extracting the desolvanted canola oil seed meal to cause solubilization of protein in said desolvanted canola oil seed meal and to form an aqueous canola protein solution having a pH of about 5 to about 6.8,
- (g) separating (h) separating the canola aqueous protein solution from residual canola oil seed meal,
- (i) increasing (j) increasing the protein concentration of said aqueous canola protein solution while maintaining the ionic strength substantially constant by using a selective membrane technique to provide a concentrated canola protein solution,

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(g) diluting (h) diluting said concentrated canola protein solution into chilled water having a temperature of below 15°C to cause the formation of discrete canola protein particles in the aqueous phase in the form of micelles,

(h) settling (i) settling the canola protein micelles to form an amorphous, sticky, gelatinous, gluten-like canola protein micellar mass, and

(i) recovering (j) recovering the canola protein micellar mass from supernatant, the canola protein micellar mass having a canola protein content of at least 90 wt% (N x 6.25) on a dry weight basis, wherein, as an alternative to said diluting, settling and recovering steps, the concentrated canola protein solution is dialyzed to reduce the salt content thereof and to cause the formation of canola protein micelles, and recovering a canola protein isolate is recovered from the dialyzed concentrated canola protein solution having a protein content of at least 100 wt% (N x 6.25) on a dry weight basis.

43. (Currently amended) The process of claim 42 wherein said canola protein isolate recovery is effected by drying the dialyzed concentrated canola protein solution.

44. to 48. (Cancelled)

49. (Currently amended) A process of preparing a canola protein isolate, which comprises:

(a) crushing canola oil seeds to form canola oil and canola oil seed meal therefrom,

(b) separating the canola oil from the canola oil seed meal.

(b) solvent (c) solvent extracting the canola oil seed meal to recover residual canola oil therefrom to produce a solvent-extracted canola oil seed meal,

(c) removing (d) removing solvent from the extracted canola oil seed meal at a temperature of about 15° to about 25°C under vacuum to provide a desolvanted canola oil seed meal,

(d) extracting (e) extracting the desolvanted canola oil seed meal to cause solubilization of protein in said desolvanted canola oil seed meal and to form an aqueous canola protein solution having a pH of about 5 to about 6.8,

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(e) separating (f) separating the canola aqueous protein solution from residual canola oil seed meal,

(f) increasing (g) increasing the protein concentration of said aqueous canola protein solution while maintaining the ionic strength substantially constant by using a selective membrane technique to provide a concentrated canola protein solution,

(g) diluting (h) diluting said concentrated canola protein solution into chilled water having a temperature of below 15°C to cause the formation of discrete canola protein particles in the aqueous phase in the form of micelles,

(h) settling (i) settling the canola protein micelles to form an amorphous, sticky, gelatinous, gluten-like canola protein micellar mass, and

(i) recovering (j) recovering the canola protein micellar mass from supernatant, the canola protein micellar mass having a canola protein content of at least 90 wt% (N x 6.25) on a dry weight basis, wherein said concentration step is effected by ultrafiltration to produce a concentrated canola protein solution having a protein content of at least 200 g/L.

50. (Cancelled)

51. (Previously presented) The process of claim 38 wherein the supernatant is concentrated to a concentration of about 200 to about 300 g/L.

52. (Previously presented) The process of claim 39 wherein the supernatant is concentrated to a concentration of about 200 to about 300 g/L.

53. (Previously presented) The process of claim 40 wherein the supernatant is concentrated to a concentration of about 200 to about 300 g/L.